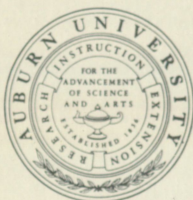


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GEOLOGICAL SURVEY OF ALABAMA

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BULLETIN 45

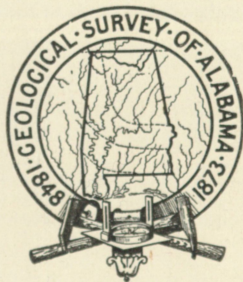
BARITE DEPOSITS OF ALABAMA

BY

GEORGE I. ADAMS

AND //

WALTER B. JONES



UNIVERSITY, ALABAMA

JUNE, 1940

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June 5, 1940

Honorable Frank M. Dixon,
Governor of Alabama,
Montgomery, Alabama.

Sir:—I have the honor to transmit herewith the manuscript of a report on the "Barite Deposits of Alabama", by George I. Adams and Walter B. Jones. It is requested that this be printed as Bulletin 45 of the Geological Survey of Alabama.

Respectfully,

STEWART J. LLOYD
Asst. State Geologist

RECEIVED
JUL 10 1940

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PREFACE

The original manuscript on barite in Alabama was written by Dr. Adams some twelve years ago but lack of funds prevented its publication by the Geological Survey at that time, and Dr. Adams died in 1932 before funds became available. The entire manuscript has lately been revised by the junior author and some new information, not available to Dr. Adams, has been incorporated in the text.

INTRODUCTION

Although barite was first recorded from Alabama in 1875, commercial production did not begin until 1914. Imports of barite from Germany in the first decade of the century had lessened domestic production, since this German material could be imported into the Atlantic seaboard states at prices that prohibited competition by domestic producers. The outbreak of the World War and the consequent disruption of German shipping found this country without a domestic output large enough to fill domestic needs, although ample undeveloped reserves were known and could be immediately exploited. The beginnings of Alabama production may be attributed to this wartime stimulation. The expansion of the industry in the state was rapid, reaching an all-time peak in 1917 with gradual declination in the years following. Even with the removal of the impetus of war, production of barite continued until the deposits under exploitation had been exhausted or depleted, although few if any new deposits were opened in Alabama subsequent to the war boom. Production of barite in the state ceased in 1925 and has been resumed since that time only sporadically and on a small scale.

The average prices per ton of crude barite in the United States for the past twenty years are shown in the following table:

1918	-----	\$6.73
1919	-----	8.25
1920	-----	9.39
1921	-----	8.02
1922	-----	7.25
1923	-----	7.70
1924	-----	7.85
1925	-----	7.47
1926	-----	7.45
1927	-----	6.57
1928	-----	6.51
1929	-----	6.67
1930	-----	6.55
1931	-----	5.70
1932	-----	5.74
1933	-----	5.08
1934	-----	5.29

1935	-----	5.56
1936	-----	5.91
1937	-----	6.30
1938	-----	6.47

The following papers contain the most important discussions of Alabama barite:

- Adams, G. I., Butts, Charles, Stephenson, L. W., and Cooke, C. W.:
Geology of Alabama; Geol. Survey Alabama, Spec. Rept. 14,
1926. (Contains the most complete discussion of the Paleozoic
stratigraphy of the state.)
- Adams, G. I.: Hydrothermal origin of the barite in Alabama;
Econ. Geol., vol. 25, pp. 621-626, 1930.
- Grasty, J. S.: Barite deposits of Alabama; The Tradesman, July
17, 1913, p. 35.
- Jones, W. B.: Index to the mineral resources of Alabama: a re-
vision of Bulletin 9; Geol. Survey Alabama, Bull. 28, pp. 23-24,
1926.
- Jones, W. B.: The non-metallic minerals of Alabama; Pit and
Quarry, Oct. 7, 1931.
- Jones, W. B.: Barite deposits of the Sinks District, Bibb County,
Alabama; (ABSTRACT) Alabama Acad. Sci., Jour., vol. 6,
p. 22, 1935.
- Jones, W. B. and McVay, T. N.: Barite deposits of the Sinks Dis-
trict, Bibb County, Alabama; Econ. Geol., vol. 29, pp. 761-766,
1934.
- McCalley, Henry: Alabama barite, or heavy spar; Alabama Ind.
& Sci. Soc., Proc., vol. 5, pp. 25-29, 1895.
- O'Meara, R. G., and Coe, G. D.: Froth flotation of southern barite
ores; American Inst. Min. & Met. Eng., Tech. Pub. 678, 1937.
- Watson, T. L., and Grasty, J. S.: Barite of the Appalachian states;
American Inst. Min. & Met. Eng., Trans., vol. 51, pp. 514-599,
1916.

GEOLOGICAL RELATIONS OF THE BARITE DEPOSITS

It will be seen on examination of figure 1 that one of the barite localities in Alabama is in the crystallines and that eight are in the area of the Cambrian and Ordovician formations. The Cambrian and Ordovician rocks are exposed principally in the Valley Regions of the northeastern part of the state, which are approximately shown on the map by the portion left white. They have a northeast-southwest trend, corresponding with the axial direction of the anticlinal folds of the region and the general trend of the whole Appalachian province.

The western belts of these rocks are separated by synclinal areas of Mississippian and Pennsylvanian formations. The exposure of the Cambrian and Ordovician rocks between these fields is due to the erosion of the later Paleozoic rocks in the anticlinal areas. Toward the border of the crystalline there is conspicuous faulting with the later Paleozoic rocks removed by erosion exposing a wide belt of Cambrian-Ordovician. No attempt has been made in this sketch map to show the Silurian and Devonian rocks which, if present, outcrop as narrow bands on the borders of the units shown.

The geologic section in Alabama from the base of the Cambrian to the top of the Ordovician, shown in the following table, will be useful in discussing the occurrence of the barite deposits. The formations are grouped to show the equivalence of the Knox dolomite and the Pelham limestone of the older reports because these names occur in some of the references given in this bulletin and have been used by previous writers in discussing the origin of the deposits.

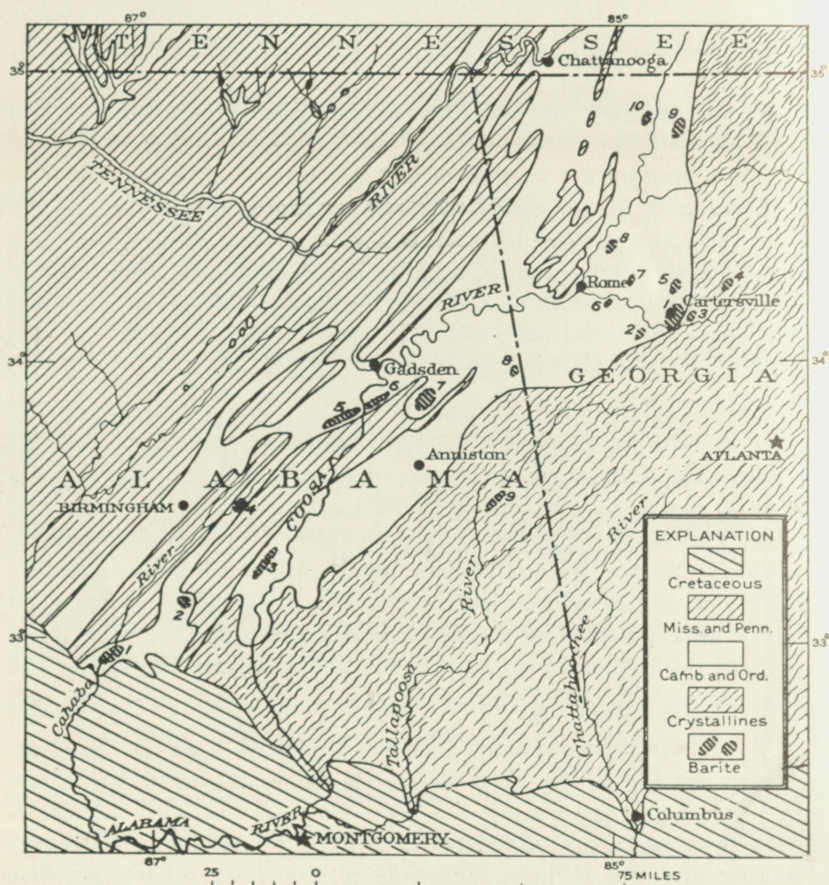


Fig. 1. Sketch map showing the positions and general geologic relations of the barite districts in Alabama and Georgia.

Partial Geologic Section in northeastern Alabama

Ordovician (Pelham limestone of early reports)	Little Oak limestone.....	50-500 feet
	Athens shale	15-300 feet
	Lenoir limestone	500 feet
	Mosheim limestone	100 feet
	Odenville limestone	50 feet
	Newala limestone	1000 feet
Cambro-Ordovician (Knox dolomite of early reports)	Longview limestone	500 feet
	Chepultepec dolomite	1000-1100 feet
	Copper Ridge dolomite	1800-2000 feet
	Bibb dolomite	250- 600 feet
	Ketona dolomite	250- 600 feet
	Brierfield dolomite	1500 feet
Cambrian	Conasauga formation	500-1900 feet
	Rome formation	1000-2250 feet
	Shady dolomite	500-1000 feet
	Weisner quartzite	1700-5500 feet

It will be observed that the Cambro-Ordovician (Knox) formations are dolomites and that they are succeeded by Ordovician formations (Pelham) which are characteristically limestone. This difference in lithology is of importance in the problem of the occurrence of the barite in districts numbered 1 to 7 inclusive in which the original deposits occur as irregular veins and replacements. In district number 8 the barite occurs as veins in the Weisner formation, and in district number 9 as veins in the pre-Cambrian crystallines (Ashland schist). There are thus three relationships of the barite deposits to be discussed.

Smith and McCalley¹ state that the barite is found as boulders or irregular masses imbedded in the residual clays derived from the Trenton limestone. McCalley² considers that the principal deposits are along the dividing line between the Knox and Pelham, although many of the lesser deposits are far within the boundary of the Knox and it is possible that there are pockets and veins within the Pelham. The statements refer, of course, to the occurrences in the Ordovician and Cambro-Ordovician formations only since McCalley and Smith were unaware of the existence of the pre-Cambrian and Cambrian deposits.

¹Smith, Eugene A., and McCalley, Henry; Index to the mineral resources of Alabama, Geol. Survey of Ala., Bulletin 9, 1904, p. 62.

²McCalley, Henry; Report on the Valley Regions of Alabama. Part II. On the Coosa Valley Region, Geol. Survey of Alabama, Special Report 9, 1897, p. 87.

It should be explained that the deposits which have been worked are residual in character, the barite occurring in red clay resulting from weathering of the underlying rocks. Loose pieces of barite associated with chert are also found in fields where they have been carried by erosion. The old workings which were visited by the writers have slumped so that in most cases the original deposits that may have been encountered in mining, cannot now be seen. At the Dorrough property, district No. 4, southwest of Leeds, and the Bertha Mineral Company mine, district No. 7 north of Angel Station, however, irregular veins and replacements were seen in the pinnacles of limestone in the pits. Such veins also show up in some of the deeper pits in the Bibb County district. The formation carrying the veins at these localities is the base of the Ordovician and corresponds to the top of the Knox of earlier reports. However, the distribution of the surface occurrences of loose pieces of barite and the location of certain of the old pits appear to justify the opinions of Smith and McCalley as to the range of the deposits. While the Cambro-Ordovician dolomites and the Ordovician limestones were the principal formations in which deposition took place, there is the sporadic occurrence in the Mississippian in Madison County near New Market which implies that the solutions which brought in the barium carried some of it to higher horizons before their barium content was exhausted.

The writers suggest that the principal barite localities are in the dolomites which were sheared and fractured at depth after the folding which determined the principal features of the Appalachian structure. Vein deposits are also found in the Weisner formation, of basal Cambrian age. The range of deposition in the unmetamorphosed sediments is accordingly from the base of the Paleozoic upward into the Mississippian. That the solutions probably came from deep magmatic sources is indicated by the occurrences of the veins in the pre-Cambrian crystallines.

ORIGIN OF THE BARITE*

The barite marketed from Alabama has come from concentrations in residual deposits in which it is associated with red clays. The form of certain of the deposits is strongly suggestive of sink holes. In some of the pits, limestones and dolomites are exposed with barite occurring in them as irregular veins and replacements. Occasional aggregates of barite crystals with good faces indicate local deposition in cavities. Rounded barite nodules and crusts afford evidence of some solution and redeposition. The origin of the primary deposits, however, has not been satisfactorily explained; particularly the source of the barite, the agencies involved, and the time of deposition.

Recently the writers found two deposits of barite in Alabama which are new modes of occurrence in the state and has made observations on some related metallic deposits which afford information that leads him to the conclusion that the barite is of hydrothermal origin, that its source was from deep seated magmas, and that it was deposited after the formation of the main structural features of the Appalachians.

In previous discussions it has been emphasized that the barite localities are in all cases near the contact of the Trenton limestones and the Knox dolomite,³ and that these formations outcrop in narrow northwestward trending bands, whose positions are determined by the folding and faulting that formed the Appalachians.⁴

The two deposits which the writer here reports as new modes of occurrence in Alabama are situated near the border of Georgia. At one locality (number eight in figure 1) in the southeastern corner of Cherokee County near the great overthrust fault plane on which the crystallines overrode the Paleozoics, there are veins of barite in the shales of the Weisner formation which is of Lower Cambrian age. At the other locality (number nine in figure 1) in the southwestern part of Cleburne County, there are veins in Ashland schist. The Ashland schist is probably pre-Cambrian, but

*This discussion of the origin of the barite was published in *Economic Geology*, vol. 26, no. 7, November 1931, with permission of the Geological Survey of Alabama in advance of this bulletin.

³Smith, Eugene A., and McCalley, Henry; Index to the Mineral Resources of Alabama, *Geol. Survey Alabama, Bull. 9*, 1904, p. 62.

⁴Smith, Eugene A., Statistics of the Mineral Production of Alabama for 1915, *Geol. Survey Alabama, Bull. 19*, 1917, p. 12.

the veins are parallel with the schistosity which was induced during the Appalachian revolution and the age of the veins is therefore probably as late as the close of the Paleozoic. The veins at these localities are of only minor economic importance, being only twelve to perhaps eighteen inches thick, but they are of great scientific interest. The barite veins in schists are in an area containing auriferous quartz veins and mica deposits and are presumably of hydrothermal origin. It is reasonable to suppose that the other deposits of barite in Alabama were formed at the same time and by the same agencies.

There is corroborative evidence that the barite in the dolomites and limestones is of hydrothermal origin. McCalley⁵ reported that the barite near Tampa (now Angel Station), Alabama (locality 7, figure 1), carries some galena, perhaps argentiferous. It is well known that near this locality there are the "Old Lead Mines" at which a little digging was done during the Civil War. Sphalerite is associated with the galena in these pits. Early reports that the ore carries silver have been verified by Dr. Robert Hodges, formerly a chemist of the Alabama Geological Survey. At Jamestown in Cherokee County, about 18 miles northeast of these old lead mines, there is another lead prospect. This locality has long been known and was prospected in 1917. A little sphalerite is associated with the galena and the ore is said to carry about two ounces of silver to the ton.

In the anticlinal valley in which the barite deposits numbered 3 and 5 are shown (figure 1), and about half way between them at Odenville, there is a shallow copper prospect which has not been previously reported. Small pieces of rock showing malachite incrustations had occasionally been picked up in a field for many years prior to the digging of a shallow shaft. Just how the copper occurs cannot be seen since the opening has caved in, but there is limestone showing in the shaft and presumably the metallization was hydrothermal. The size of the deposit does not seem to justify commercial development.

The writers are indebted to the Geological Department of the Tennessee Coal, Iron and Railroad Company of Birmingham for the information that Mr. Douglas Gordon found fluorite with

⁵McCalley, Henry; Report on the Valley Regions of Alabama. (Paleozoic strata). Part 2. On the Coosa Valley Region, Geol. Survey Alabama, Special Report 9, p. 715. 1897.

the barite at locality number 4, figure 1, in Alabama. This association is good evidence of the origin which is here advocated. Fluorite, in intimate association with barite, has also been found in several of the pits in the Sinks district of Bibb County.

In Alabama no igneous rocks are known which cut the less metamorphosed Paleozoics. Mr. S. W. McCallie, State Geologist of Georgia, told the writers of a locality near Rome, Georgia at which there is an intrusive in the Conasauga shales which escaped the notice of C. W. Hayes who prepared the Rome Folio. In general appearance the intrusive very closely resembles a fine grained dolomite and such rocks, if they occur in Alabama, are not likely to be recognized in reconnaissance mapping. Because of the occurrence of an intrusive in Georgia well within the area of the Paleozoics, it is reasonable to suppose that magmatic solutions may have invaded the Paleozoics to the northwest of the great overthrust fault which separates them from the crystallines. That the galena and sphalerite at the "Old Lead Mines" near Angel Station and the prospect near Jamestown, the copper at Odenville and the fluorite associated with barite at several localities in Alabama are of hydrothermal origin is a natural conclusion, and that the barite is of hydrothermal origin is a natural corollary.

Several authorities have studied the barite deposits of Georgia. Hull,⁶ from whose report the positions of the barite deposits in Georgia shown in figure 1 are taken, has written concerning them: "The origin of the barite may be generally and somewhat hypothetically stated as follows: barium originally in the feldspars and micas of the crystalline rocks was removed in solution by circulating meteoric and thermal waters, and carried from uncertain depths upward through channels made by faulting and fracturing in the earth's crust to limestone formation where favorable precipitating reactions caused the deposition of the barium sulphate, barite." This statement in part follows the opinion of Hayes and Phalen⁷, that the original source of the barium is to be found in the silicates of the metal contained in the igneous rocks from which it is derived as the carbonate during the ordinary processes of weathering.

⁶Hull, J. P. D., Report on the Barite Deposits of Georgia, Geol. Survey Georgia, Bull. 36, 1920, p. 16.

⁷Hayes, C. W., and Phalen, W. C.; A Commercial Occurrence of Barite near Cartersville, Ga., U. S. Geol. Survey, Bull. 340, 1908, p. 458.

In discussing the barite deposits of Alabama, Grasty⁸ emphasizes the importance of structural conditions and says that there is a general concordance of opinion that none of the deposits are of deep seated origin and that therefore they were formed by descending meteoric waters. He admits, however, that they are the results of the action of the thermal springs. This reference to thermal springs probably shows the influence of the writings of Hayes who even in discussing the origin of bauxites in the region, appealed to the action of meteoric waters which issued as springs that were probably thermal and may in some cases have formed geysers.

Watson and Grasty⁹, who have reviewed the barite deposits of the Appalachian states, do not make a definite statement as to the origin of the barite, although in many places they present information which implies a hydrothermal origin for important primary deposits.

In contrast with these ideas concerning the origin of barite in dolomites and limestones may be cited the opinion of Tarr¹⁰, who from his studies in Missouri, concluded that the barite of that state was deposited at shallow depths by ascending thermal waters of igneous origin, and suggests that these deposits were formed during deformation in Cretaceous time.

The writers are of the opinion that the barite deposits of Alabama are of mesothermal and epithermal origin and that the barium was brought up in emanations from magmas and deposited as veins and replacements which were formed after the main Appalachian structure was developed at the close of the Paleozoic.

BARITE DISTRICTS IN ALABAMA

Major Districts

The occurrences of barite which have been mined or prospected may be grouped into nine localities or districts (see figure 2). These may be enumerated as follows:

⁸Grasty, J. S.: Barite deposits of Alabama, *The Tradesman*, July 17, 1913, p. 35.

⁹Watson, T. L., and Grasty, J. S.: Barite of the Appalachian States, *Am. Inst. Min. & Met. Engrs., Trans.*, vol. 51, 1915, p. 515-559.

¹⁰Tarr, W. A.: The Barite deposits of Missouri, *Univ. of Missouri Studies*, vol. 3, no. 1, 1917, p. 100. See also *Econ. Geol.*, vol. 14, pp. 44-67.

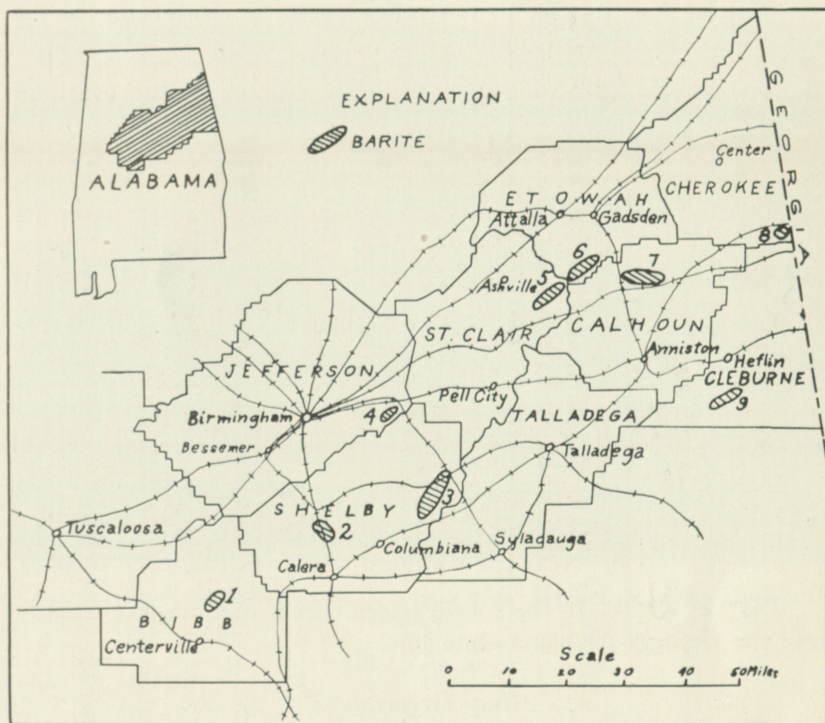


Fig. 2 Geographic relations of the barite deposits of Alabama

Fig. 2. Sketch map showing the geographic relations of the barite deposits in Alabama.

District No. 1. Six to ten miles north of Centerville in the northern part of Bibb County.

District No. 2. Longview, Saginaw district in the southern part of Shelby County.

District No. 3. The Vincent, Harpersville, Wilsonville district in the eastern part of Shelby County.

District No. 4. Three and a half miles southwest of Leeds in Jefferson County.

District No. 5. Beaver Creek Valley, east of Ashville in St. Clair County.

District No. 6. Greens Creek Valley on the southern border of Etowah County.

District No. 7. Near Angel Station in the northwestern part of Calhoun County.

District No. 8. Near the southern border of Cleburne County.

District No. 9. In the southeastern corner of Cherokee County near the Georgia-Alabama state line.

Minor Occurrences

Three minor occurrences of barite have been reported which should be mentioned here.

Mr. Charles S. Blair, geologist of the Tennessee Coal, Iron and Railroad Company of Birmingham, reports¹¹ a small amount of barite in the Birmingham valley south of Birmingham. The presence of a small amount of barite in the form of loose lumps in the residual soil from the Mississippian limestones near New Market, Madison County, on the northern border of the state has been noted¹², but the extent of this deposit is not known

¹¹Oral communication.

¹²Jones, W. B.: Index to the mineral resources of Alabama: a revision of Bulletin No. 9, Geol. Survey Alabama, Bull. 28, 1926, p. 23.



Fig. 3. Block of barite in test pit near New Market, Madison County, Alabama.

Loose chunks of barite in residual deposits on the Shady dolomite were noted by Dr. Charles Butts at the east base of Columbiana Mountain, SW $\frac{1}{4}$ SW $\frac{1}{4}$ section 17, T 21 S, R 1 E, 3 miles northeast of Columbiana

Barium in Waters of Blount Springs

Sulphur waters at Blount Springs, about 30 miles north of Birmingham, were analyzed by Dr. R. S. Hodges, Chemist of the Geological Survey of Alabama¹³ and found to contain 4.6 parts of barium per million.

The complete analysis is given in the following table:

	Parts per million
Potassium (K)	14.2
Sodium (Na)	234.3
Lithium (Li)	1.2
Magnesium (Mg)	24.3
Calcium (Ca)	51.4
Barium (Ba)	4.6
Strontium (Sr)	2.4
Iron (Fe)	.8
Alumina (Al_2O_3)	1.5
Chlorine (Cl)	325.1
Bromine (Br)	1.9
Iodine (I)	trace
Sulphuric acid (H_2SO_4)	trace
Carbonic acid (HCO_2)	279.1
Sulphuretted hydrogen (H_2S)	56.5
Silica (SiO_2)	26.5

It will be observed that the water contains considerable sodium chloride and sulphuretted hydrogen.

Blount Springs is situated on the southern end of the Sequatchie anticline. At this locality there is a small exposure of the Chattanooga shale (Devonian) surrounded by Ft. Payne chert and other higher Mississippian formations. The Cambro-Ordovician and Ordovician rocks underlie the area at a considerable depth.

The source of the barium in the spring water cannot be determined with certainty, but it is reasonable to conclude that it is derived from barite deposited in some of the deeper formations.

¹²Smith, Eugene A.: The underground water resources of Alabama; Geol. Survey Alabama, Mono. 6, 1907, p. 68.

DISCUSSION OF ALABAMA BARITE BY COUNTIES

Bibb County

The barite deposits of Bibb County are adjacent to the Cahaba River and Six Mile Creek, six to ten miles north and a little east of Centerville, the county seat. Most of the known barite deposits of the district are in adjacent parts of Township 25 North, Ranges 10 and 11 East. The nearest rail shipping point is Piper, six miles away.

The district is gently rolling to rugged, with an average difference in elevation of about 100 feet. Paleozoic formations occupy the lowland where the cover of sands and gravels of the Tuscaloosa formation of Upper Cretaceous age have been removed. Cretaceous gravels can still be found capping the higher points.

This area has long been known as the "Sinks," from the large number of limestone sink holes in the region. The "Sinks" is in a sharply folded and faulted zone of Paleozoic rocks just above the fall-line of the Mississippi Embayment. It is immediately south of the Cahaba Coal field, from which it is separated by a major fault. The region surrounding the barite deposits is also faulted.

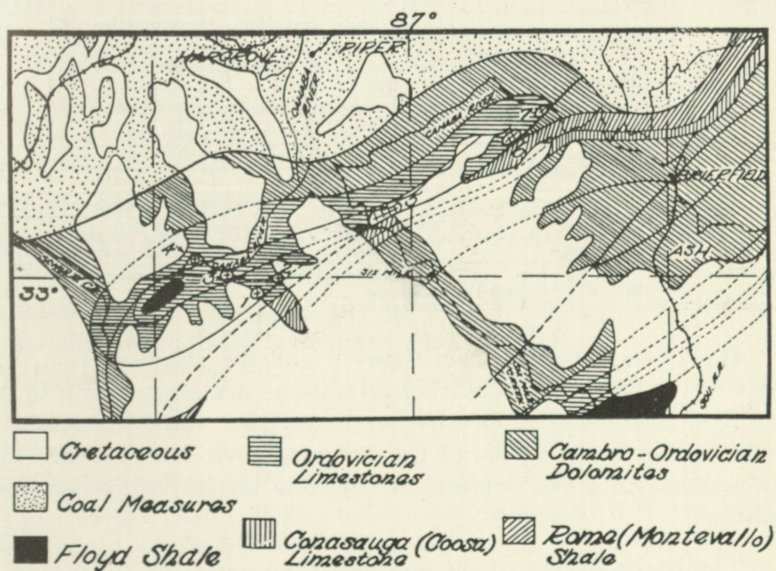


Fig. 4. Sketch map showing the geology and barite deposits of the "Sinks" district, Bibb County, Alabama. (Taken from Jones & McVay: Barite Deposits of the Sinks District, Bibb County, Alabama; Econ. Geol., vol. 29, no. 8, p. 762, December 1934.)

The origin of the barite in this district is discussed in some detail earlier in this report (see p. 13). It might be repeated, however, that the occurrence of fluorite as incrustations on, as well as intimately associated with the barite is regarded as supporting the hydrothermal theory of origin. Several of the test pits in the Sinks district proper show fluorite in amounts varying from a trace to approximately 2 per cent. The existence of veins, stringers, and masses of barite in unweathered, apparently non-shattered limestone, certainly signifies replacement, but does not clarify the method or methods by which such replacement was accomplished. Apparently the fluorite and barite were formed at or about the same time. The mineralized solutions quite evidently travelled along fault or bedding planes. The formation was by the crystallization of barium sulphate, present in dilute solutions which followed such fissures.

The formations exposed in the region are shown in the following table:

Cretaceous	Tuscaloosa	Sand, gravel and clays.....	0-50'
	Little Oak Limestone	Dark, thick-bedded, coarsely crystalline limestone	300'
Ordovician	Lenoir	Dark, finely crystalline, low-magnesian limestone	500'
	Mosheim	Thin-bedded, abundantly fossiliferous limestone	100'
	Newala	Almost entirely massive-bedded limestone..	1000'
	Longview	Mostly cherty limestone, in part dolomite.....	500'
	Chepultepec	Chert-bearing dolomite, limestone near bottom	1000'
Cambro-Ordovician	Copper Ridge	Light gray, siliceous to cherty dolomite.....	2000'
	Bibb	Coarse-grained, highly siliceous dolomite.....	400'
	Brierfield	Thick-bedded, blue, siliceous dolomite.....	1500'
Cambrian	Conasauga	Dark limestone and occasional shale members	500'
	Rome (Montevallo)	Red shale and rusty colored calcareous sandstone	2000'

It will be observed from figure 4 and the above section, that most of the Cambro-Ordovician formations are faulted out, bringing the barite-bearing Ordovician limestones into juxtaposition with the Rome formation, of Cambrian age. It is significant that the majority of barite deposits of Alabama are in Ordovician limestones.

The barite occurs along the fault that separates the Rome or Montevallo shales from Ordovician limestones. In the northeast section, the fault dips approximately 65° SE, with the Rome (Montevallo) shale resting on the limestone and its residual soil

in which the barite occurs. One test pit went through 30 feet of shale and then encountered barite-bearing clay at what was considered the fault plane. In the rest of the area, the faults are not so evident.

In the northeastern part of the region, the mineralized zone is in or near the fault plane, and to the southwest the barite zones widen out for a maximum distance of several hundred feet from the fault. It is possible that there may be additional minor faults in this part of the field. It appears that most of the deposits are in the Newala formation, although the Fancher seems to be in the Mosheim formation. One of the most interesting features of the deposit is the existence of masses of barite in unweathered limestone, commonly in considerable quantity. This undoubtedly accounts for the unusual concentration of the ore in residual soil over portions of the area.

The barite, mostly white in color, occurs in veins and in other cavities in the limestone. The contacts between the limestone and barite are in most cases sharp, with no alteration of the limestone. However, in some places the limestone has been altered, is colored green by chlorite, and contains small crystals of fluorite. Some of the barite crystals that formed in cavities were large, attaining two to three inches in length.

Fluorite is also associated with barite in some of the samples, but is segregated. Where fluorite is present, it occurs in veins, as fairly large crystals in the barite, or at the contact between the barite and the limestone. Calcite crystals are also associated with the barite in places. A few cavities in the barite contain small crystals of sulphur.

Limonite, the only accessory mineral, fluorite, calcite and native sulphur were found associated with the barite.

This group of deposits is regarded by the writers as having distinct commercial aspects, both from the quality and quantity of the ore. The average barite content in the residual soil is much higher than in other Alabama deposits which have been operated in the past. There is no apparent reason why these deposits should not be profitably mined, but thorough testing should be done in advance of any development to accurately determine the amount and quality of barite available.

Individual Properties

Julian Fancher (SE $\frac{1}{4}$ SE $\frac{1}{4}$, sec. 17, T 24 N, R 11 E).—The occurrence here appears to be in the Mosheim formation, although the exposures are too poor for accurate determination.

This property has been worked in the past on a small scale with considerable success, some 1000 tons having been removed during a brief period of activity. Modern mining methods were not employed until the operations of the Alabama Barite Company were begun and their efficient washer was installed. Extremely rich deposits of residual barite overlying Lower Paleozoic limestone have been struck during these operations in the past, and all surface indications in the area seem to indicate that further extremely rich deposits might well be anticipated. In the cuts now exposed the material is rather low in tenor, but the same geological and mineralogical conditions exist under the whole general region. Much of the area has not been sufficiently tested for barite possibilities, and if the mining operations in the past can be considered as a criterion by which to judge the future, further explorations should reveal considerable commercial barite as yet undiscovered.

The barite exceeded one-half ton per cubic yard of dirt at this place when production was actually taking place, but there has not been sufficient prospecting on which to base accurate estimates of reserves. Further extensive trenching, pitting, and auger drilling in the vicinity of the present workings should uncover other residual barite in sufficient quantity to warrant further development.

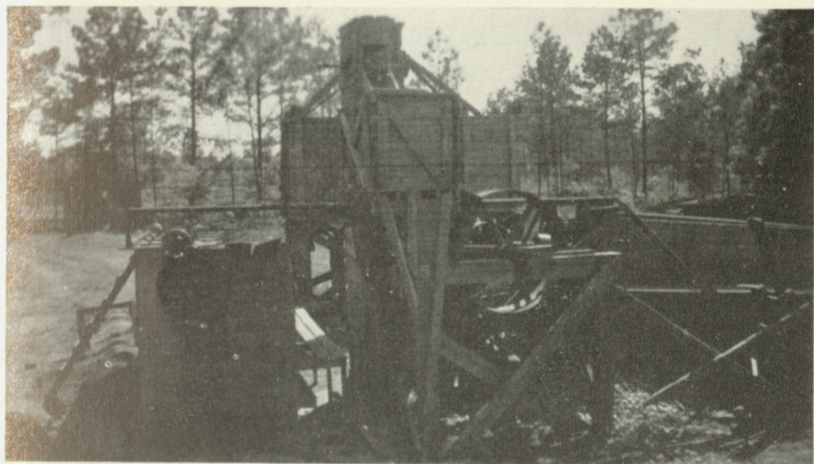


Fig. 5. Washer of Alabama Barite Corporation on Fancher property.



Fig. 6. View from above, looking down on washer of Alabama Barite Company on Fancher property, Bibb County.



Fig. 7. Pit on Fancher property showing pinnacles of limestone protruding through residual barite-bearing clays.



Fig. 8. Pit on Fancher property showing blocks of residual barite.

Sinks Proper (Sections 24, 25, and 36, T 24 N, R 10 E, and section 30, T 24 N, R 11 E).—This deposit evidently is in the Newala Limestone, and averages 400 feet wide and about 4500 feet long. The depth of weathering averages 15 feet. The estimated yield, according to evidence gathered from about one hundred test pits and trenches, will be one-half ton per cubic yard, or 300,000 tons. In several of the test pits, each yard of residual soil produced as high as three tons of barite. The color is white to light gray, and the barite is of sufficiently high quality to be valuable in the oil industry as a weighted drilling mud. Chemical analyses on some of these deposits made in the past indicate that there is some fluorite present in the barite which would make it useless for the manufacture of lithopone. All of these deposits, however, have not been analyzed, and it is possible that the fluorine is present in only a few of them. For the oil industry the fluorine does not matter, as it is present in such small quantities that its effect in lowering the specific gravity is negligible.



Fig. 9. Test pits in the "Sinks" district, Bibb County.

B. A. Cotes (NW $\frac{1}{4}$ section 3) and *H. H. Cotes* (NE $\frac{1}{4}$ section 4, T 23 N, R 10 E).—This occurrence is probably in the Newala limestone. There has been a small amount of prospecting, and some barite was shipped from this place in 1917-18. The reserves are not known.

May Johnston (SE $\frac{1}{4}$ section 34, T 24 N, R 10 E).—This locality was noted by McCalley,¹⁴ and some barite was dug out of the head of a small branch and shipped in 1917-18. No data regarding reserves are available. It appears to be in the Newala limestone.

Walton Pratt (Pratt Ferry) (Section 33, T 24 N, R 10 E).—Barite here has been known for many years, and the large masses on the surface are particularly characteristic. The occurrence is evidently in the Mosheim formation.

Mrs. Julia Wallace (SW $\frac{1}{4}$ SE $\frac{1}{4}$, section 29, T 24 N, R 10 E).—This locality is also known as River Bend. The barite occurs here as irregular veins and masses in the Newala limestone.

Maguire Shoals (NW $\frac{1}{4}$ section 16, T 24 N, R 11 E).—Barite has been frequently reported from this place, but there has been no prospecting nor production. The barite apparently occurs in the Newala limestone, but can be seen only as residual surface accumulations.

Shelby County

The barite deposits in Shelby County may be considered as lying in two districts, one on the eastern border of the county near Vincent, Harpersville, and Wilsonville, not far from the Coosa River and the other near Longview and Saginaw in the southeastern part of the county. The first district lies to the east of the southern end of the Coosa Coal Field. In both districts the barite occurs in the Newala limestone or has been derived from it by weathering. The rocks exposed in the area are similar in general to those found in the Bibb County barite district (see p. 21).

¹⁴McCalley, Henry: Report on the Valley Regions of Alabama. Part 2. On the Coosa Valley Region; Geol. Survey Alabama, Special Report 9, 1937, p. 493.

Vincent, Harpersville, Wilsonville District

Development of this district began in 1916 and sporadic production was carried on for six or seven years. The barite occurs as small irregular masses in residual clays derived by weathering from limestones of Beekmantown age (Newala formation).

The World War impetus was responsible for the brief flurry of activity in this region. An attempt by the Alabama Barite Company to revive the district in 1922 was unsuccessful, although some barite was shipped in that year from Harpersville. A later attempt at revival in 1929 also resulted in failure. Some barite was mined but it was never shipped.

Individual properties

Luther Davis (Section 14, T 19 S, R 2 E).—This locality is about three-fourths of a mile west of Vincent. It is said to have produced several cars of barite about 1920.

T. C. Elliott (SW $\frac{1}{4}$ section 9, T 19 S, R 2 E).—This property is located about two and a half miles a little north west of Vincent.

Mrs. Lulu Montgomery (NW $\frac{1}{4}$ section 9, T 19 S, R 2 E).—This land lies just to the north of the T. C. Elliott property.

W. W. Wyatt (W $\frac{1}{2}$ SW $\frac{1}{4}$ section 4, T 19 S, R 2 E).—The production from this land which lies about 2 miles south of Harpersville was important in this district in the early days of barite development. There is a pile of large lumps of barite, amounting to about half a car load, which was hauled from the pits to the roadside during the attempted revival of the industry in 1929, but the barite was never shipped. The deposit which runs northeast and southwest for about one-half mile is in lowland near a small creek. The last shipments were made in 1917-18.

T. J. Florey (NE $\frac{1}{4}$ section 4, T 19 S, R 2 E).—This land joins the W. W. Wyatt land. There was some production from it at the time the Wyatt deposit was worked.

Mrs. R. P. Tucker (W $\frac{1}{2}$ of NW $\frac{1}{4}$ section 3, T 19 S, R 2 E).—Barite has been dug on this land which lies just east of the Florey property.

Mrs. Pertie Howland (NW $\frac{1}{4}$ NW $\frac{1}{4}$ section 36, T 20 S, R 1 E).—The barite dug from the pit on this property is said to have amounted to about 40 car loads of 35 tons each. Shipments were made in 1917-18. The pit is in lowland near Four Mile Creek and about a mile and a half northwest of Wilsonville.

Longview, Saginaw District

The deposits of this district were the most recently discovered of the Alabama barite deposits, but their history is much like that of the other regions. The mining operations were confined to two localities, but there are other places where barite has been found. The country rock to which the deposits are related is the Beekmantown (Newala) limestone. It is said that between 10 and 15 car loads of barite were produced in 1917-18.

Individual properties

Longview Lime Works (SW $\frac{1}{4}$ SE $\frac{1}{4}$ section 17, T 21 S, R 2 W).—This barite deposit which is about three-fourths of a mile east of Longview is said to have been worked about 1917-18 and a considerable production obtained. The pit is near the end of one of the tram lines of the Longview Lime Works and the deposit is related to the Newala limestone which was used there at that time for lime.

C. V. Moore, J. E. Naish, and A. M. Leonard (SW $\frac{1}{4}$ section 17, T 21 S, R 2 W).—These lands join in the southeast quarter of section 17 with the lands which were worked for barite by the Longview Lime Works. It is said that some barite was obtained from these properties when the Longview pit was operated.

C. B. Naish (NE $\frac{1}{4}$ NE $\frac{1}{4}$ section 18, T 21 S, R 2 W).—This property is about three-quarters of a mile southeast of Saginaw. In recent years Mr. Naish has opened up a pit and a few cars of material of extremely high grade have been shipped. The residual clays here are very rich in barite and yield large, pure blocks of this material. One such block collected by the Geological Survey weighs about 40 pounds and runs better than 98% BaSO₄.

C. Johnson (NW $\frac{1}{4}$ NW $\frac{1}{4}$ section 18, T 21 S, R 3 W).—Some barite has been found on this land, but there has been no production.

Jefferson County

There is only one barite locality in Jefferson County which has been exploited. It is situated about three and one-half miles southwest of Leeds in the Cahaba Valley which lies between the Coosa Coal Field on the east and the Cahaba Coal Field on the West. In this valley, which is developed on a faulted anticline, the Newala limestone is found on the east limb of the fold and may be seen in the barite pit. There are said to be minor occurrences of barite to the southwest in this valley in Jefferson County, but they have never been prospected.

Individual properties

J. M. Dorough (NW $\frac{1}{4}$ NW $\frac{1}{4}$ section 31, T 17 S, R 1 E).—The pit from which the barite was mined on this land is situated just south of a small tributary of the Little Cahaba River and a short distance to the east of the public road. Irregularly weathered limestone is exposed in the bottom of the pit. It shows calcite veins and irregular vein-like replacements of barite. The barite was mined from the residual clay and was washed in a steam driven log washer. Some large masses of barite were found but most of the output consisted of small pieces. Several hundred tons of barite were produced in 1916-17 before the pit was abandoned.

St. Clair County

The barite deposits in St. Clair County are in Beaver Creek Valley, which structurally is a continuation to the northeast of the Cahaba Valley in Jefferson County. The geologic setting of the barite deposits is, therefore, similar in the two counties.

The barite occurs in the area of the Chepultepec and Copper Ridge dolomites, but the Beekmantown limestone, which includes the Newala formation, overlies the dolomites and since the formations are now well exposed it is difficult to say in which formation the barite deposits were formed. This is particularly true of the barite which is found on the surface and in the accumulations of weathered material.

Barite has been reported from the vicinity of Pell City, but careful inquiry has revealed no definite information concerning this supposed occurrence.

Individual properties

A. T. Cox (NW $\frac{1}{4}$ NE $\frac{1}{4}$ section 21, T 14 S, R 4 E).—This is the southwestern deposit in the Beaver Creek Valley. There are several shallow prospect pits in a field from which some weathered barite was obtained. Barite may also be picked up among the chert fragments which are conspicuous on the surface.

Will Morris (SW $\frac{1}{4}$ SW $\frac{1}{4}$ section 3, T 13 S, R 5 E).—The pit from which barite was mined on this property is in low ground near Beaver Creek. Irregularly weathered limestone showing veins of barite is exposed in the bottom of the pit. The barite which was produced consisted of loose masses and nodules which were mixed with detrital chert. Near the pit, which is on the border of a small branch, chert has been dug for road material and barite was seen in one side of the pit near the base of the chert deposit.

In 1906 the deposit was worked and the barite hauled to a loading wharf built on the bank of the Coosa River at Greensport. It was the intention to ship it by barge either to Gadsden or to Lock 3 where it would be transferred for railway shipment. About 5 years after the barite was mined, however, the wharf collapsed and the barite was precipitated into the river.

Pete Green (Center of SW $\frac{1}{4}$ section 1, T 13 S, R 5 E).—This locality, which is about a half mile west of Greensport, was described by Henry McCalley¹⁵ as showing an outcrop of barite in a seam eight to ten inches wide on the public road. He stated that the mineral occurs in other places in the belt and that it is said to carry specks of galena (lead sulfide). This locality has also been mentioned in subsequent reports.

Etowah County

Greens Valley, which lies along Greens Creek at the northwestern base of Green Creek Mountain in the southernmost part of Etowah County is structurally a continuation of Beaver Creek Valley in St. Clair County and the geological conditions found in the two valleys are similar. The barite which has been dug in Greens Valley was obtained from residual material resulting from weathering of Beekmantown (Newala ?) limestone.

¹⁵McCalley, Henry: The Valley Regions of Alabama. Part 2. The Coosa Valley Region; Geol. Survey Alabama, Special Report 9, 1897, p. 262.

Production from this county has been very small and the deposits seem too small and scattered to merit much further production.

Individual properties

John T. Hagen (NE $\frac{1}{4}$ SE $\frac{1}{4}$ section 3, T 3 S, R 6 E).—The principal outcrop of barite at this locality is on the extensive holdings of John T. Hagen. There is a smaller showing in the NW $\frac{1}{4}$ SE $\frac{1}{4}$ of the same section.

Giles Myric (NE $\frac{1}{4}$ SW $\frac{1}{4}$ section 15, T 13 S, R 6 E).—Some barite obtained on this land was hauled to the railway and shipped. The amount was reported as about one car load.

Mrs. Alice Campbell (NW $\frac{1}{4}$ SE $\frac{1}{4}$ section 15, T 13 S, R 6 E).—A small amount of barite has been dug on the west side of this farm. It was hauled to the railway and shipped together with that from the Myric property just mentioned.

Mrs. N. E. Miller (NW $\frac{1}{4}$ NE $\frac{1}{4}$ section 14, T 13 S, R 6 E).—Barite has been found along a ditch on this land, but has not been produced commercially.

Sparks (SE $\frac{1}{4}$ section 35, T 12 S, R 8 E).—Barite occurs in irregular masses in the limestone at a big spring on this land.

Calhoun County

There has been more barite produced from this county than from any other in Alabama. A small output was recorded for 1914 and sporadic production continued for eleven years.

The most important deposits in the county occur in an area of the Chelapultepec and Copper Ridge dolomites. Some of the smaller deposits are found in areas underlain by Newala limestone of Beekmantown age. These formations are included in the old "Knox" dolomites of the early reports of the Geological Survey.

The "Old Lead Mines" near the barite deposits are of interest in connection with the question of the origin of these barite deposits as the presence of "galena, perhaps argentiferous" in barite, noted by McCalley, implies a related mode of origin for the two types of deposit.

Individual properties

Bertha Mineral Company (NE $\frac{1}{4}$ SW $\frac{1}{4}$ section 29, T 13 S, R 8 E).—This mine is on land belonging to John Gory, and was formerly known as the Willingham property. In 1919 the Glidden Barytes Company was operating here but its interest was sold to the Bertha Mineral Company in May 1920. Under this new management adequate machinery for hoisting and washing the barite was installed and the washed material was shipped direct by the Seaboard Railway from Angel Station to the grinding mills at Cartersville, Georgia.

The barite was obtained from residual clays but irregular veins and replacements of barite may be seen in the dolomitic limestones which are exposed by the workings. The large, deep open pit attests the importance of the operations at this mine.

A. A. Williams (NW $\frac{1}{4}$ section 16, T 13 S, R 8 E).—The workings seen on this property were by the roadside where barite was recovered from the residual clay overlying limestone bedrock. Forty car loads of ore are said to have been shipped from this place about 1920.

E. L. Green (NE $\frac{1}{4}$ section 16, T 13 S, R 8 E).—There are some test holes on this property which have yielded barite in small quantities.

Tullis, now *Tom Moore* (NE $\frac{1}{4}$ SE $\frac{1}{4}$ section 6, T 14 S, R 8 E).—McCalley wrote as follows¹⁰ concerning the barite at this locality: "It occurs in Mr. Tullis' land near Tampa in the N.E. $\frac{1}{4}$ of S.E. $\frac{1}{4}$, Sec. 6, T. 14, R. S, in loose nodules and small boulders through a deep red loam, for a distance of a couple of hundred yards and to a depth of some 20 feet. It is for the most part of good quality, though some of it is stained a dark color. It carries some galena, perhaps argentiferous, in spots."

Considerable barite was mined and shipped from this property in the early days of exploitation in the county.

Mrs. Martha Stone (NE $\frac{1}{4}$ SE $\frac{1}{4}$ section 8, T 14 S, R 8 E).—This occurrence is the easternmost place at which barite has been reported in the county.

¹⁰McCalley, Henry: The Valley Regions of Alabama. Part 2. The Coosa Valley Region; Geol. Survey Alabama, Special Report 9, 1897, p. 715.

Mrs. Mary Henderson ($N\frac{1}{2}$ $SE\frac{1}{4}$ section 5, T 14 S, R 8 E).—Only a little prospecting has been done at the barite deposit on this land.

Jack Braughton ($NW\frac{1}{4}$ $NW\frac{1}{4}$ section 18, T 14 S, R 8 E).—The occurrence of barite near the lead mine on this property has been reported.

Bud Clark ($SW\frac{1}{4}$ $NW\frac{1}{4}$ section 18, T 14 S, R 8 E).—This is a locality noted by McCalley who stated that barite was found there on the Gadsden-Jacksonville road and that it was said to be in considerable quantity just to the northeast of this point. It is reported that three car loads were produced from this property.

S. J. Clark ($SW\frac{1}{4}$ $SE\frac{1}{4}$ section 36, T 13 S, R 7 E). — The barite on this property has not been worked but its presence has been proven.

Egbert and Isaac Clark ($SE\frac{1}{4}$ $SE\frac{1}{4}$ section 36, T 13 S, R 7 E). —This barite locality is practically a continuation of that on the S. J. Clark property.

Joe Johnson ($NE\frac{1}{4}$ $SW\frac{1}{4}$ section 36, T 13 S, R 7 E).—The developments on this land are small. The locality was noted by McCalley as given above and described as being on a small detached patch or knoll of the "Knox" formation. He commented that the mineral occurs there as usual at the top of the formation.

J. F. Noah ($S\frac{1}{2}$ $SW\frac{1}{4}$ section 25, T 13 S, R 7 E).—Barite has been found in the fields and hill slopes on this farm.

Mrs. Fannie Broughton ($SE\frac{1}{4}$ $SE\frac{1}{4}$ section 26, T 13 S, R 7 E). —Barite has been found on this land but has never been sufficiently tested for commercial development.

R. R. Heathcock ($SE\frac{1}{4}$ $SW\frac{1}{4}$ section 26, T 13 S, R 7 E).—Loose pieces of barite have been seen on this farm.

Tom Walker ($SW\frac{1}{4}$ $SE\frac{1}{4}$ section 27, T 13 S, R 7 E).—This locality is reported to contain barite.

Albert Taylor ($SE\frac{1}{4}$ $SW\frac{1}{4}$ section 27, T 13 S, R 7 E).—On this land the presence of barite has been known for a long time, but the quantity present has never been definitely determined.

Milt Phillips (SE $\frac{1}{4}$ SE $\frac{1}{4}$ section 23, T 13 S, R 7 E).—The occurrence of barite on this land is near the east line of the section. There is said to be some barite in the northeast corner of the section to the south.

Cleburne County

The two barite deposits in this county are of especial interest because they occur as veins cutting Ashland schist. This mode of occurrence indicates the introduction of the barite subsequent to the structure induced by the diastrophic movements near the close of the Paleozoic era when the Appalachian mountains were formed. It also is significant as to the source of the barite since it implies a hydrothermal origin.

Individual properties

Hart (NW $\frac{1}{4}$ NE $\frac{1}{4}$ section 35, T 17 S, R 10 E).—In 1929 the writer found an old barite prospect on this land. The pit had caved in, but solid pieces of barite on the dump indicated a vein twelve to possibly eighteen inches thick. The barite vein occurs in Ashland schist, has a steep dip to the southeast and strikes northeast. This opening was probably made about 1900 but no definite date for the work could be learned. The land at that time belonged to Mrs. Mary Hart of Abingdon, Va., but has since become the property of her heirs.

Mrs. Mat Teague (NW $\frac{1}{4}$ SW $\frac{1}{4}$ section 19, T 17 S, R 11 E).—Mr. Pat Ayers, who lives near Micaville, told the writers in the summer of 1930 of the occurrence of barite at this locality. He recalled that it was prospected about 1900. The barite occurs as a vein in schists. It was examined in 1930 to determine its potential commercial value but it was found to show massive barite from eight to twelve inches thick, frozen to schist walls and probably too limited, in extent to be economically workable. The strike of the vein is to the northeast and it dips steeply southeastward.

Cherokee County

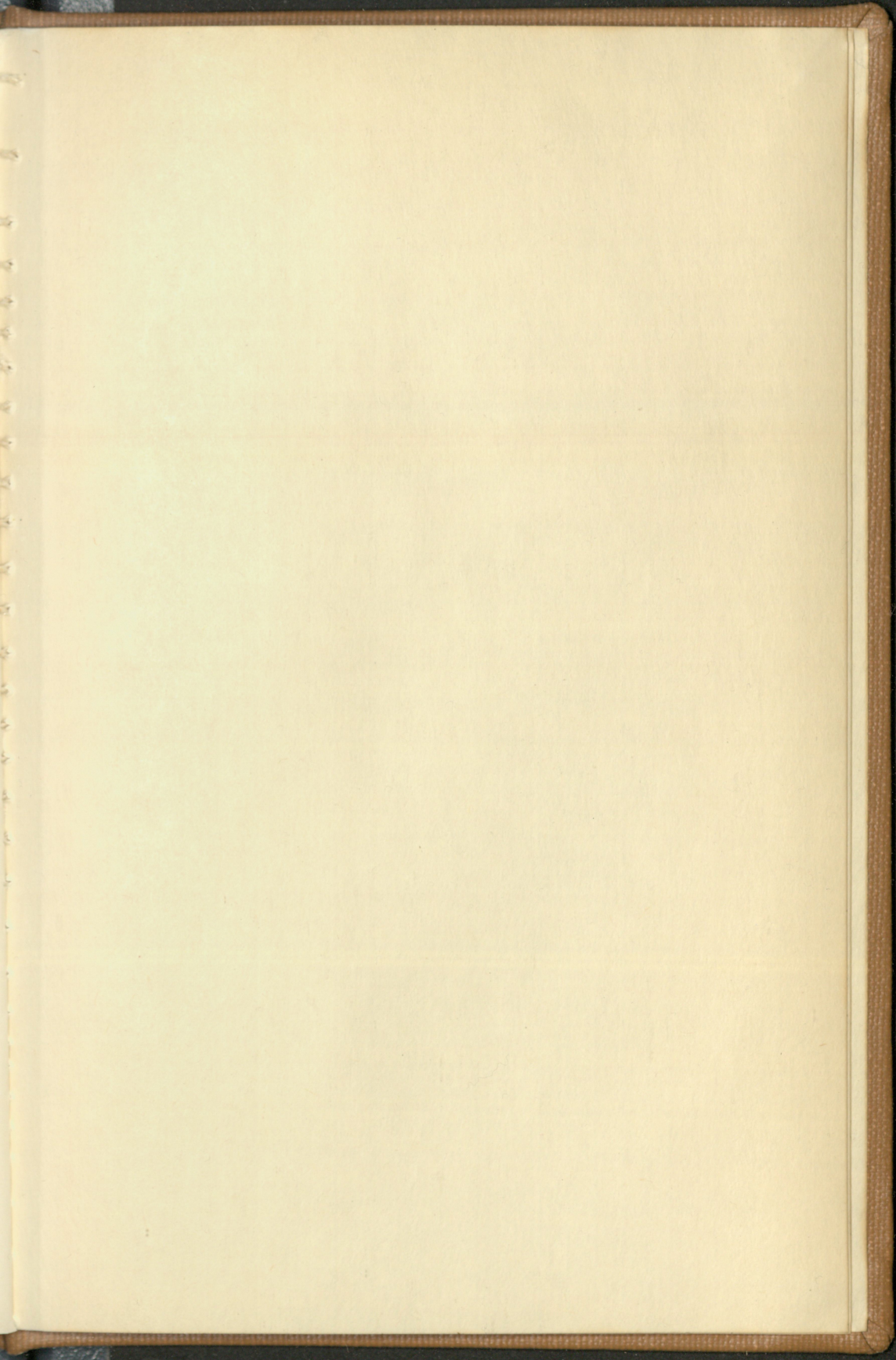
In Cherokee County only one deposit of barite is known, situated in the extreme southeastern corner of the county close to the Georgia line. Attention was directed to this vicinity because J. P. D. Hull¹⁷ stated that barite had been prospected in north-

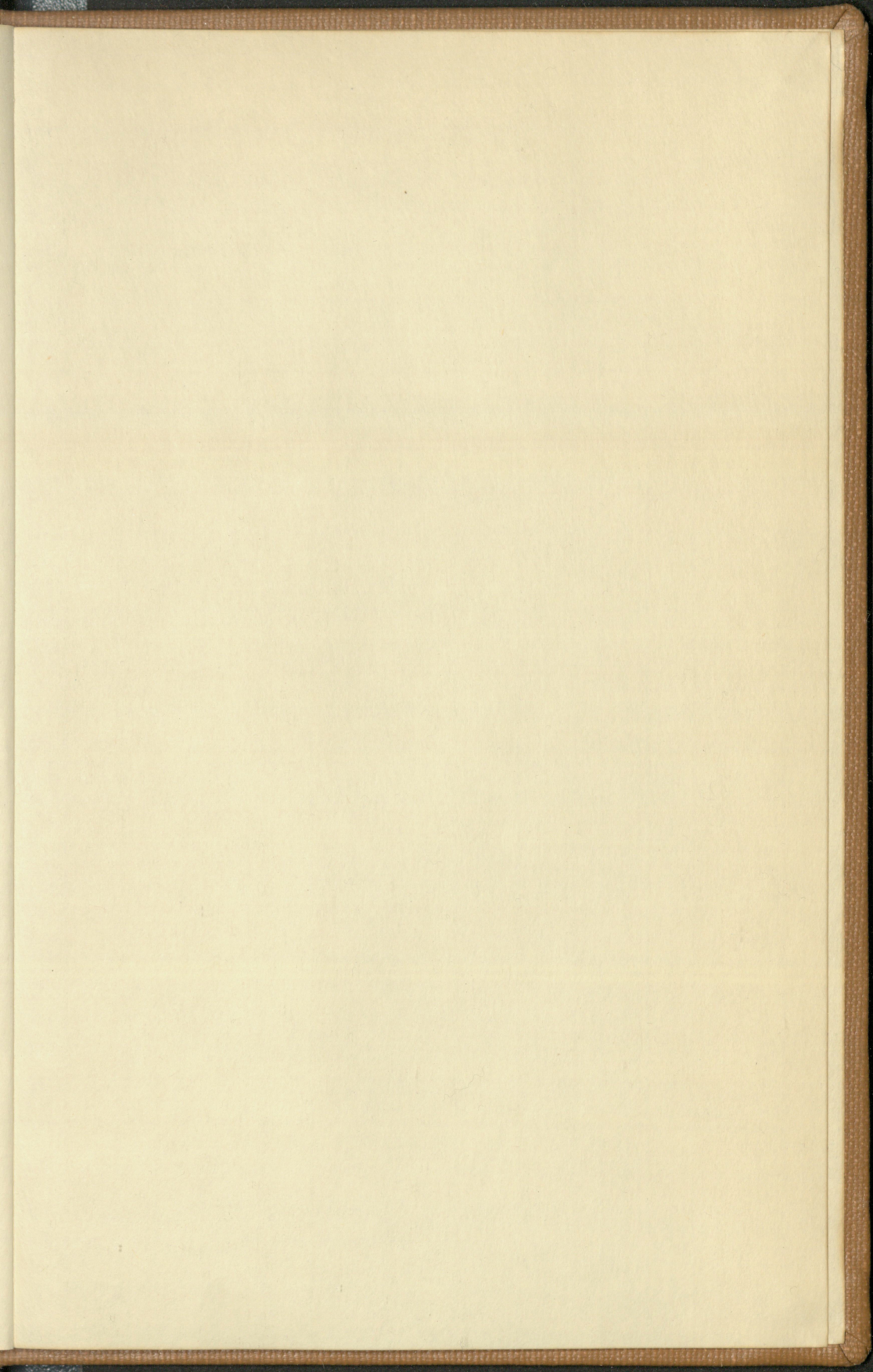
eastern Cleburne County, Alabama. In searching for the deposit it was found that instead of being in Cleburne County the barite actually occurs in Cherokee County close to the county line.

This locality is unique in Alabama since the barite occurs as a vein cutting a shale series. The shales are presumably in the Weisner (Lower Cambrian) formation and they occur about three miles north of the great overthrust fault along which the crystalline rock overrode the Paleozoics.

Individual properties

Frank Gillum (NW $\frac{1}{4}$ SE $\frac{1}{4}$ section 25, T 12 S, R 11 E).—The prospects on this property are said to have been dug about 1917. The country rock is shale which weathers to a brownish color. The original material is difficult to see but the barite from the eastern prospect was in solid tabular pieces and indicated a vein which was reported as twelve to eighteen inches thick. The strike, as indicated by the workings, is northeast and the dip is to the southeast. The western prospect lies about two hundred yards from the eastern pit and indicates a similar occurrence of the barite. No barite could be seen in place and only a small amount had been dug out.







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